Christopher Thomas Whitlow, MD, PhD, MHA

The Forensic Panel
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BOARD CERTIFICATION

Diplomate, American Board of Radiology, #59111	2009-present

ACADEMIC APPOINTMENTS

Wake Forest School of Medicine, Winston-Salem, NC

Professor with Tenure, Radiologic Sciences	Jul 2018-present
Professor with Tenure, Clinical Translational Sciences Institute	Jul 2018-present
Professor with Tenure, Biomedical Engineering	Jul 2018-present
Professor with Tenure, Department of Biostatics and Data Science	Jul 2018-present
I. Meschan Professor of Radiology with Tenure	Jul 2018-present
Associate Professor with Tenure, Department of Biostatics	Jul 2017-2018
Associate Professor with Tenure, Biomedical Engineering	Jul 2015-2018
Associate Professor with Tenure, Radiologic Sciences	Jul 2014-2018
Associate Professor with Tenure, Clinical Translational Sciences Institute	Jul 2014-2018
Graduate School Faculty	Jul 2013-present
Assistant Professor, Clinical Translational Science Institute	Jul 2011-Jun 2014
Assistant Professor, Radiologic Sciences	Jul 2010-Jun 2014

PROFESSIONAL EXPERIENCE

Wake Forest School of Medicine, Winston-Salem, NC

Course Director, Neuroscience Graduate Program: Introduction to Neuroimaging	2017-present
Course Director, Radiology Research Elective	2013-present
Founding House Mentor (Blue House), Medical Student Learning Community	2013-present
Course Director, Community Care Clinic Elective	2012-present
Clinical Coach, Medical Student Clinical Skills Curriculum	2014-2017
Clinical Coach, Medical Student Clinical Skills Curriculum	2014-2017
Faculty, School of Medicine LAUNCH Program	2014-2015

Karolinska Institutet, Stockholm, Sweden
Institute for Neonatology

Honorary Research Fellow, Department of Women's and Children's Health	Jan 2014-2020

ADMINISTRATIVE SERVICE

Wake Forest School of Medicine, Winston-Salem, NC

Interim Chair, Department of Radiology	2020-present
Co-Leader, Signaling and Biotechnology (SBT) Program, Comprehensive Cancer Center	2018-2020
Translational Imaging Program (TIP) Advisory Committee	2018-present
Senior Leadership Committee, Comprehensive Cancer Center	2018-present
Clarkson Campus Primate Center Internal Advisory Committee	2018-present
Internal Advisory Committee, Alzheimer's Disease Research Center	2017-present

PROFESSIONAL EXPERIENCE - ***ADMINISTRATIVE SERVICE CONTINUED…***

Executive Committee, Brain Tumor Center of Excellence	2017-present
Executive Committee, Alzheimer's Disease Research Center	2017-present
Women in Medicine and Science (WIMS) Committee	2016-present
Radiology Chair Advisory Council	2015-present
Chief of Neuroradiology	2015-present
Vice-Chair of Imaging Informatics	2017-present
Neuroscience Graduate Program Executive Committee	2014-present
Committee on Graduate School of Arts and Sciences	2014-present
Quality Improvement Medical School Curriculum Committee	2013-present
Biomedical Sciences Committee	2013-present
Medical Student Learning Community House Mentorship Committee	2013-2015
Director, Combined M.D./Ph.D. Program	2012-present
Neuroradiology Fellowship Selection Committee	2010-present
Radiology Resident Education Committee	2010-present
Clinical and Translational Sciences Institute (CTSI)	
Director, Translational Imaging Program of the CTSI	2017-present
Advisor, Non-Human Primate Signature Program of the CTSI	2017-present
Director, Collaboration and Team Science Program of the CTSI	2016-2018
Vice-Chair of Faculty Development	2015-2017

PROFESSIONAL COMMITTEE APPOINTMENTS

American College of Radiology (ACR)	
Research Selection Committee: Fund for Collaborative Research in Imaging	2019-present
ACR Commission on Research	2019-present
Director, Head Injury Institute	2018-present
ACR Commission on Neuroradiology	2018-present
Co-Chair, Data Sciences Institute Neuroradiology Use Case Panel	2017-present
Radiological Society of North America (RSNA)	
RSNA Public Information Committee	2018-present
RadioGraphics Editorial Board, Public Information Advisors Network (PIAN)	2017-present
RadioGraphics Editorial Board, Public Information Advisors Network (PIAN)	2016-present
Public Information Advisors Network (PIAN)	2015-present
Neuroradiology/Head & Neck Scientific Program Committee	2012-present
Neuroradiology Educational Exhibit Review Panel	2008-present
American Society Functional Neuroradiology (ASFNR)	
Executive Committee - Research Chair	2018-present
Executive Committee - Treasure	2016-present
Research Committee	2011-present
RSNA Quantitative Imaging Biomarkers Alliance (QIBA)	
Co-Chair, DTI Profile Committee	2018-present
American Society of Neuroradiology (ASNR)	
Website and Social Media Oversight Committee	2016-present
Program Committee	2014-present
Co-Chair, Study Group for Clinical Translation of Functional & Diffusion MRI	2013-present
Research Committee	2012-present

PROFESSIONAL EXPERIENCE – *PROFESSIONAL COMMITTEE APPOINTMENTS CONTINUED…*

American College Radiology (ACR) Head Injury Institute
Co-Chair, Traumatic Brian Injury-Reporting and Data System (TBI-RADS) 2016-present
Research Committee 2013-present

Western North Carolina Chapter of Society for Neuroscience
Clinical Councilor 2015-2016

American Association of Medical Colleges (AAMC)
Group on Graduate Research Education and Training (GREAT)
MD-PhD Section Committee 2013-present

National Heart, Lung, and Blood Institute (NHLBI)
Coronary Artery Risk Development in Young Adults (CARDIA)
Brain Magnetic Resonance Imaging Data Analysis Working Group 2012-present
New Investigators Committee 2012-present

SERVICE AT NATIONAL/INTERNATIONAL MEETINGS

American Society of Neuroradiology 2019 Annual Meeting 2019
Moderator - Scientific Paper Session, "Trauma Neuroimaging"

American Society of Neuroradiology 2019 Annual Meeting
Moderator – Scientific Study Group, Study Group for Clinical Translation of Advanced Diffusion & Functional MRI 2019

American Society of Functional Neuroradiology 2019 Annual Meeting 2019
Moderator - Scientific Paper Session, "TBI and Concussion Imaging"

Radiologic Society of North America 2019 Annual Meeting 2019
Moderator – Scientific Paper Session, "Neuroradiology: White Matter"
Moderator – Scientific Paper Session, "Neuroradiology: Epilepsy/Metabolism/Infection"

Radiologic Society of North America 2018 Annual Meeting 2018
Moderator - Scientific Paper Session, "Dots and Dashes: Image Analysis in Neuroradiology"

American Society of Neuroradiology 2018 Annual Meeting 2018
Moderator - Scientific Study Group, Value of PET-MRI for Neurological Disorders
Moderator - Scientific Study Group, Study Group for Clinical Translation of Advanced Diffusion & Functional MRI

Radiologic Society of North America 2017 Annual Meeting 2017
Moderator - Scientific Paper Session, "Brain Tumors: Beyond the Frontier"

American Society of Neuroradiology 2017 Annual Meeting 2017
Moderator - Scientific Study Group, Study Group for Clinical Translation of Advanced Diffusion & Functional MRI

Radiologic Society of North America 2016 Annual Meeting 2016
Moderator - Scientific Paper Session, "Neuroradiology: Contrast and Radiation in Neuroimaging"

PROFESSIONAL EXPERIENCE –*SERVICE AT NATIONAL/INTERNATIONAL MEETINGS CONTINUED…*

American Society of Neuroradiology 2016 Annual Meeting 2016
Moderator - Scientific Study Group, Study Group for Clinical Translation of Advanced Diffusion & Functional MRI

International Society for Magnetic Resonance in Medicine Annual Meeting 2015
Moderator - Scientific Paper Session, "fMRI: Resting-state Functional Connectivity"

American Society of Neuroradiology 2015 Annual Meeting 2015
Moderator - Symposium, "Omics & Big Data for Brain Development/Neurodegenerative Disorders"
Moderator - Scientific Paper Session, "Machine Learning"
Moderator - Scientific Study Group, Study Group for Clinical Translation of Advanced Diffusion & Functional MRI

Radiologic Society of North America 2014 Annual Meeting 2014
Presiding Officer - Scientific Paper Session, "Resting State Functional Brain Imaging"
Presiding Officer - Scientific Paper Session, "Stroke and Cerebrovascular Reserve"

Radiologic Society of North America 2013 Annual Meeting 2013
Presiding Officer - Scientific Paper Session, "Resting State Functional Brain Imaging"
Radiologic Society of North America 2011 Annual Meeting 2011
Presiding Officer - Scientific Paper Session, "Cognition"

FUNDING AGENCY REVIEWER

Member, RSNA Research & Education Foundation Grant Review Panel 2017-present
Member, The Foundation of the American Society of Neuroradiology Grant Review Panel 2013-present
Department of Defense (DoD): Psychological Health and Traumatic Brain Injury Research Program on the Long-Term Impact of Military-Relevant Brain Injury Consortium – Clinical Studies (LIMBIC-CS) panel.

HONORS AND AWARDS

American Society of Pediatric Neuroradiology Best Oral Presentation Award:
Patterns of Structural Co-Variance Associated with Autism Spectrum Disorder in Extremely Preterm Neonate – A graph-theoretic Approach. 2019
American Society of Functional Neuroradiology Award:
Dosimetric and MRI spatial analysis of predictors of local failure following stereotactic radiosurgery for melanoma and brain metastasis. 2017
Mid-Career Investigator in Clinical Sciences Award, Wake Forest School of Medicine 2017
RadioGraphics, Editor's Recognition Award for reviewing with distinction 2014
American Society of Functional Neuroradiology Poster Award:
Effect of Resting-state fMRI repetition time on accuracy of computed graph theory metrics of brain network connectivity. 2011
Roentgen Fellow Research Award, Radiological Society of North America Research & Education Foundation 2010
Radiological Society of North America Trainee Research Prize:
Effect of constant angle insonation versus varied angle insonation on measurement of Doppler velocities in a model of carotid artery stenosis. 2009
Elias G. Theros, M.D. Research Award, Dept. of Radiology, Wake Forest School of Medicine 2009

HONORS AND AWARDS CONTINUED…

American Society of Neuroradiology (ASNR) Bayer/Neuroradiology Education & Research Foundation Fellowship in Basic Science Research 2009
Derek Harwood Nash Awards in Pediatric Neuroradiology Research, American Society of Neuroradiology and American Society of Pediatric Neuroradiology 2008
Roentgen Resident Research Award, Radiological Society of North America Research & Education Foundation 2008
American Society of Functional Neuroradiology Poster Award:
Time-dependent changes in cerebral perfusion associated with posterior reversible encephalopathy: A magnetic resonance arterial spin labeling investigation. 2008
Editorial Fellowship for Trainees, Radiological Society of North America 2007
Presidents Circle Research & Education Foundation Research Resident Grant, Radiological Society of North America 2007
Introduction to Research Program, Radiological Society of North America 2006
Medical Student Prize for Excellence in Neurology, American Academy of Neurology 2004
I. Meschan Radiology Merit Award 2004
Richard L. Burt Research Achievement Award 2004
Published Art: Mantle. Oil glaze on canvas. JAMA. 2004; 2291: 1639-1640 2004
Alpha Omega Alpha Honor Medical Society 2003
National Institute on Drug Abuse Travel Award: ICRS Annual Meeting 2001
President, Student Interest Group in Neurology 2000-2002
WFU School of Medicine Medical Student Research Day Poster Award:
Persistent effects of the acute administration of Δ^9-tetrahydrocannabinol on rates of local cerebral glucose utilization in the rat. 1999
National Institutes of Health NRSA M.D./Ph.D. Predoctoral Fellowship Grant 1998-2004
M.D./Ph.D. Academic Scholarship 1998
Magna cum laude with honors in Psychology 1997
University Book Exchange Scholarship 1994

GRANTS

Currently Active Grants **(**Principal Investigator: Whitlow)**

1. NIH C06OD030099 **(PI: Whitlow) Sept 2020-Aug 2025
Wake Forest Preclinical Imaging and Irradiation (PRIMIR) Facility.
The Wake Forest PRIMIR Facility will be located on an open site at the 200-acre Wake Forest Clarkson Campus, and provide an innovative, energy-efficient, 1-story, 10,068 square foot research building in support of ongoing rapid growth in NIH-funded non-human primate research at Wake Forest University Health Sciences. The facility will support 6 major research programs (Radiation Late Effects, Alzheimer's Disease, Aging, Substance Abuse, Neuro-oncology, and Diabetes/Metabolic Disease); 2 national NIH-funded primate resources (the Radiation Countermeasures Primate Core, and the Vervet Research Colony); and two NIH research training programs, within the context of a research-intensive NIH Clinical and Translational Sciences Award-funded institutional environment. The PRIMER research facility will include non-human primate holding areas, procedure space, radioisotope "hot lab," as well as state-of-the-art imaging with PET/CT and MRI. Beneficiaries of this new facility will include a nationwide network of NIH-funded non-human primate investigators.
Role: Principal investigator

GRANTS CONTINUED…

2. Michael J. Fox Foundation (PI: **Whitlow) Feb 2020-Jan 2022
Using Time-Varying Caloric Vestibular Stimulation to Improve Neurovascular Status in Parkinson's Disease.

Previous work demonstrated that twice-daily caloric vestibular stimulation using a ThermoNeuroModulation (TNM) device was associated with robust therapeutic gains across a broad spectrum of both motor and non-motor symptoms in Parkinson's disease (PD). Similarities in the trajectories of improvement across these diverse symptoms over both the treatment and post-treatment follow-up period suggest a domain-general, plasticity-involving mechanism of action. This project seeks to elucidate the potential systems level mechanism(s) of action underlying the broad clinical efficacy associated with time-varying caloric vestibular stimulation treatments in PD via functional magnetic resonance imaging (fMRI), focusing on autonomic regulation of cerebral blood flow and neurovascular coupling.

Role: Principal investigator

**3. NIA P30 AG049638-8438 (PI: Whitlow) July 2019-Jun 2021
Neuroimaging Core: Wake Forest Alzheimer's Disease Core Center

The Neuroimaging Core (NIC) of the newly established Wake Forest Alzheimer's Disease Core Center (ADCC) will provide biennial magnetic resonance imaging (MRI), amyloid positron emission tomography (11C-PiB PET) and tau PET (18F-AV-1451) to 200 ethnically diverse Clinical Core participants (100 normal older adults and 100 adults with mild cognitive impairment/MCI; 1/3 of each from underrepresented groups) using state of the art protocols optimized for sharing with the National Alzheimer's Coordinating Center (NACC) and with other investigators. In addition, innovative specialized sequences to assess vascular integrity will be conducted, including multiphase pseudocontinuous arterial spin label (ASL) MRI, and controlled measures of hypercapnic cerebrovascular reactivity (CVR). Thus, the new NIC will enable Wake Forest to provide specialized resources to conduct high impact research examining the longitudinal interaction of AD and vascular pathologies in an ethnically diverse, deeply phenotyped cohort. To facilitate translational research, the NIC will also apply AD MRI protocols to non-human primates (NHP) who spontaneously develop age-related amyloid pathology and metabolic/vascular disease. The Core will leverage an extensive imaging infrastructure with dedicated research resources, including a 3T Siemens Skyra MRI scanner with a high-resolution 32- channel head coil, GE 16-slice PET/CT Discovery ST Scanner, GE PETtrace 10 Cyclotron Radiotracer Production System, and automated analytic pipelines. NIC members will also carry out educational and consultation activities to encourage the expansion of AD-related imaging research at Wake Forest. The NIC will: 1) conduct state of the art longitudinal MR, amyloid, and tau imaging in Wake Forest ADCC's ethnically diverse Clinical Core, using protocols aligned with the national ADC network; 2) refine and implement sensitive MRI protocols for vascular integrity (ASL and CVR) that will facilitate understanding of the relationships between vascular and AD pathology and provide methodological innovations to enhance the reliability of multi-site vascular imaging; 3) develop and implement neuroimaging protocols for innovative translational NHP models; and 4) integrate quality-controlled imaging data with clinical and other biomarker data in a user-friendly relational database to facilitate dissemination and use by ADCC, NACC and other investigators.

Role: Principal Investigator/Project Leader

4. NIMH 1R01MH116675 (PI: **Whitlow/Constantinidis) Aug 2018-Jun 2023
Neurophysiology of Working Memory Maturation in Adolescence

Working memory, a core component of cognitive control, has been found to continue to improve into young adulthood in humans. Non-human primate work also indicates a protracted development of prefrontal cortex that parallels human findings of continued improvements in working memory from puberty to adulthood. However, there is a paucity in the study of pubertal cognitive development in non-human primate models, limiting our understanding of the neural basis of working memory **GRANTS CONTINUED…**

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development in humans. The overarching goal of the current project is to develop a functional understanding of the neural changes that the prefrontal cortex undergoes during cognitive maturation. Such knowledge about normal function may inform conditions that affect cognitive maturation, such as TBI and other neurodegenerative processes.

Role: Principal Investigator - Director of Neuroimaging

**5. NCI P01 CA207206-5401 (PI: Whitlow) 08/01/2017-07/31/2022

Imaging Core: Maximizing local access to therapeutic deliveries in GBM

Advanced imaging plays a vital role in neuro-oncology research. The goal of this Imaging Core (Core 4), is to provide expertise and access to advanced imaging equipment required by the various projects of this P01 proposal, with three specific aims: Specific Aim 1: To utilize non-invasive imaging to diagnose glioblastoma, evaluate longitudinal progression, and response to therapy. Specific Aim 2: To directly radiolabel our novel targeted therapeutics and evaluate long-term biodistribution and tumor targeting. Specific Aim 3: To image loco-regional therapy administration to ensure proper placement of our advanced delivery vehicles and proper therapeutic distribution. Thus, Core 4 will provide indispensable services to all Projects in this PPG application. It will comply with one of the most important requirements in developing efficient drug delivery means by offering direct visualization of malignant lesions, access of drugs to these lesions and changes in their response to therapy. Core 4 integration with all the projects represents a considerable strength of our PPG application.

Role: Principal Investigator/Project Leader

6. NINDS R01NS091602 (PI: **Whitlow/Stitzel) Jul 2016-Jun 2021

iTAKL: Imaging Telemetry And Kinematic modeLing - high school football.

Head impacts during American football involve significant forces that can result in mild to severe traumatic brain injury (TBI). While TBI has received increasing attention at the professional and collegiate levels, there is less data available for the millions of participants in high school leagues (14- 18 years old) during this time of rapid brain development. The purpose of this study is to relate information about cumulative head impact exposure over a season of high school football with neurocognitive and neuroimaging data (MRI and MEG) to determine the effects of sub-concussive impacts on the brain. All elements of this study focus on the objective to increase understanding of pediatric mild TBI and prospectively collect biomechanical, imaging, functional, and computational modeling data.

Role: Principal investigator

7. NCAA-DoD (PI: **Whitlow/Miles/Lintner) Jun 2016-Sep 2021

Wake Forest University - CARE 2.0: A Prospective, Longitudinal Study of the Intermediate and Cumulative Effects of Concussion and Repetitive Head Impact Exposure in NCAA Student-athletes and U.S. Military Service Academy Members

The NCAA-DoD Care Consortium is a large-scale, multi-site study of the natural history of concussion in both sexes and multiple sports that will address the current gaps in our knowledge, and shed light on the neurobiological mechanisms of concussion symptoms and trajectory of recovery. It will provide a cohort of richly phenotyped individuals with sports-related concussion to contribute to other datasets for public use, and result in a more informed public debate about concussion care and policy.

Role: Principal investigator

8. NIDDK R01 DK119913 (PI: McClain) Jan 2019-Dec 2023

Iron Reduction for the Treatment of Diabetes and Nonalcoholic Fatty Liver Disease

A link between tissue iron and the risk of type 2 diabetes mellitus (T2DM) has been demonstrated across several diverse populations, usually as a relationship between diabetes prevalence and serum levels of ferritin, a marker of tissue iron. Importantly, risk increases through the entire range of normal ferritin. There is convincing evidence of beneficial effects of reducing iron in pathologic iron overload

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such as that seen in hereditary hemochromatosis or beta thalassemia, but the data in typical T2DM and in the normal ranges of ferritin are less clear-cut. We have demonstrated a benefit of dietary iron reduction in several mouse models of diabetes, and present data from a pilot trial in humans that also shows improvement of glycemia with phlebotomy. Dose responsiveness and time course of that benefit, however, are not known. Up to 60% of people with T2DM also have fatty liver, a condition that can progress to nonalcoholic steatohepatitis (NASH) and cirrhosis, liver failure and/or hepatocellular carcinoma. Like diabetes, NASH and ferritin are also associated, but the same questions of causality and reversibility have not been convincingly resolved. Hypothesis: We hypothesize that iron contributes to the pathogenesis and progression of T2DM and NASH, and that individuals with tissue iron levels, as reflected by serum ferritin, in the upper ranges of normal will benefit from reducing iron by phlebotomy to levels in the lower ranges of normal. The benefit will be manifest by improvements in glycemia resulting from improvements in both insulin sensitivity and insulin secretory capacity, and decreases in indices of liver damage and inflammation in those individuals with NASH. Specific Aims: We propose a randomized, placebo-controlled trial at Wake Forest and UNC Chapel Hill to determine if there is a beneficial effect of iron reduction by phlebotomy on T2DM, prediabetes, and presumed NASH. We will test if iron reduction will improve: (1) Glycemia, with a primary outcome of improvement in HgbA1C 6 months after phlebotomy, and as secondary outcomes other measures of glycemia and Metabolic Syndrome; (2) Clinical indices of presumed NASH, primarily serum transaminases 12 months after phlebotomy, and also liver stiffness by elastography, and; (3) Insulin sensitivity and/or secretory capacity. Clinical impact: If positive effects could be demonstrated in a large and diverse cohort, with better definition of dose-responsiveness and treatment thresholds, this would define a range of optimal serum ferritin much narrower that the broad range of normal and justify widespread adoption of a simple, safe, inexpensive, and acceptable treatment modality (blood donation) for T2DM, prediabetes, and NASH in the large fraction of the population with body iron stores in the higher range of normal.

Role: Co-Investigator

9. NIA R01 AG060754 (PI: Constantinidis) Feb 2019-Dec 2023

Primate Model of Deep Brain Stimulation for Alzheimer's and Age-Related Cognitive Decline

This project will investigate the potential of deep brain stimulation to improve cognitive abilities in aging, and counteract the effects of Alzheimer's and other types of dementias. We will perform experiments in nonhuman primates, because they experience a similar age-related cognitive decline as humans. Stimulation will be applied in the Nucleus Basalis of Meynert, the sole source of acetylcholine to neocortex. Drawing from recent experiments showing success of this method, intermittent stimulation will be delivered at 60 pulses per second for 20 seconds of each minute in old monkeys. The study design will test the efficacy of stimulation, and the duration of benefits after the intervention. Use of complementary pharmacological agents will determine if short-term effects of stimulation on cognition may be augmented by other agents, and what pharmacological systems they interact with. Partial nicotinic acetylcholine receptor agonists, positive allosteric modulators, serotonergic and noradrenergic agents will be tested, as will other agents that interact with cholinesterase inhibitors. In addition, the project will determine whether deep brain stimulation can ameliorate pathological changes associated with Alzheimer's dementias, as noted by biochemical, metabolic, and brain structural measures.

Role: Co-Investigator

10. NINDS R01 AG064014 (PI: Brinkley) Apr 2019-Mar 2024

Dietary Effects on Imaging and Fluid-based Biomarkers of the Adipose-Brain Axis in Alzheimers Disease

The present proposal, seeks to advance our understanding of how crosstalk between adipose tissue (AT) and the brain may contribute to the pathophysiology of Alzheimer's disease (AD). The scientific premise is based on the fact that while body mass index (BMI) is an independent predictor of AD in

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both mid- and late-life, the association with this crude global measure of obesity is confounded by agingrelated changes in AT distribution and function. Although the underlying mechanisms remain to be elucidated, it is clear that BMI is not sufficient to fully understand the obesity-associated risks for AD. Diet influences the risk of both obesity and AD, and investigating dietary interventions that can modulate both AT and the brain may provide critical insight into the overlapping molecular pathways linking these diseases. Our preliminary data suggest that greater amounts of AT in central / visceral (VAT) depots and lower amounts of AT in peripheral / subcutaneous (SAT) depots are associated with a cerebrospinal fluid (CSF) biomarker profile indicative of increased AD pathology. Moreover, minimizing the loss of protective SAT depots following a ketogenic diet may favorably impact AD pathology. To confirm and extend these findings, we propose to conduct an ancillary study to the Brain Energy for Amyloid Transformation in AD (BEAT-AD) trial, a phase 2 randomized clinical trial designed to examine the effects of a 4-month Modified Mediterranean Ketogenic (MMK) diet versus an American Heart Association (AHA) low-fat diet on brain health in 120 adults (age: 55 to 85 years) with amnestic mild cognitive impairment (aMCI) (R01AG055122; PI: Craft). The proposed study will leverage ongoing study procedures, data, and samples to generate new data on AT distribution and function, including their relationship with AD biomarkers and their modulation by diet. Specifically, CT imaging will be leveraged to quantify changes in the cross-sectional area and density of VAT, SAT, and intermuscular AT in the abdomen and thigh, as well as fatty infiltration of liver and skeletal muscle. FDG-PET imaging will also be leveraged to quantify changes in glucose uptake (i.e., metabolic activity) in AT depots of interest. Finally, stored blood and CSF will be used to assess changes in circulating adipokines and AT-derived exosomes. To complement the ongoing collection of CSF, FDG-PET, amyloid PET, and structural/functional MRI, the proposed study will also add 18F-AV-1451 tau PET in a subset of participants (n=60), which will enhance the categorization of participants across the AD spectrum as defined by the NIA-AA Research Framework. This timely, cost-effective, and innovative study will not only expand the scope and impact of the parent trial, but will also address important gaps in the field. Investigating AT distribution and function in the context of the MMK diet may reveal novel targets that are amenable to intervention and new therapeutic agents that can alter the trajectory of AD.

Role: Co-Investigator

11. NCI P01 CA207206 (PI: Debinski) Aug 2018-July 2022

Maximizing local access to therapeutic deliveries in GBM

Effective treatments for Glioblastoma (GBM), a primary brain tumor, remains an unmet medical need. The major obstacles to GBM treatment are the accessibility of GBM tumors to drugs through natural physiological and pathobiological barriers like the blood-brain barrier (BBB) and blood-brain tumor barrier (BBTB), respectively, and the adequate properties of drugs. In addition, complex pathobiology of GBM, including local invasion and intratumoral heterogeneity represent major challenges to generating effective anti-GBM drugs. The unifying theme of our PPG is the exploitation of local access to brain tumors like GBM to achieve and then maximize therapeutic effect in patients. This local access can be accomplished either by direct loco-regional delivery of drugs into the tumor mass and its vicinity or by disrupting the BBB/BBTB. For example, drugs can be delivered locally through convection-enhanced delivery (CED). The overall hypothesis of this PPG is that we can deliver the next generation of molecularly targeted drug candidates to GBM effectively by either significantly re- designed CED and/or by precision BBB/BBTB disruption. To address this hypothesis, we are developing convection-enhanced thermo-chemotherapy catheter system (CETCS) based on a novel arborizing catheter. Furthermore, the BBB disruption will be tested in two innovative ways using: (i) high-frequency irreversible electroporation (H-FIRE), or (ii) a combined approach of stem cells expressing tumor necrosis factor-α (TNFα), a cytokine with a potential to significantly enhance BBB permeability, under a heat responsive promoter that can be remotely activated using high intensity focused ultrasound (HIFU). We will exploit a unique animal model of spontaneous gliomas in dogs, which is amenable to

testing medical devices/surgical procedures, and thus is one of the most valuable tools in addressing our PPG's unifying theme. We will explore our hypothesis in three Specific Aims. In Aim 1, we will generate targeted cytotoxic drugs with an increased access to tumors and/or pathophysiologically important tumor compartments. We will generate targeted drug conjugates with BBB-penetrating chemotherapeutics. In Aim2, we will attempt to bypass the BBB/BBTB by developing CED that addresses critical clinical needs. We will evaluate an arborizing catheter for broad distribution of infusates and accurate saturation of target volume in brain tissue. We will evaluate targeted drugs distribution and efficacy by CETCS for treating spontaneous GBM in a canine model. In Aim 3, we will bypass the BBB/BBTB by induced disruption. This will be achieved with H-FIRE treatment allowing for preferential targeting infiltrating tumor cells. We will assess H-FIRE protocols to combinatorially treat spontaneous gliomas in dogs with targeted cytotoxic agents. We will also examine stem cells engineered to express TNFα. Thus, our PPG proposal represents a combined rational approach of novel therapeutic approaches to improve delivery of unique drug candidates of enhanced access to GBM tumor and its compartments. This program is well suited for rapid translation to clinical settings in a foreseeable future.

Role: Co-Investigator

12. NIMH R01 MH117996 (PI: Constantinidis) July 2018-Apr 2023

Neurophysiology of Cognitive Development and Response Inhibition

We will investigate the neural substrates of the maturation of response inhibition between the time of adolescence and adulthood. Response inhibition is thought to be mediated by the prefrontal cortex, a cortical area greatly expanded in primates compared to other vertebrates, which undergoes a long maturation process that mirrors the development of higher cognitive functions after adolescence. A number of mental illnesses have onsets linked to the maturation of the prefrontal cortex, most notably schizophrenia, which manifests itself in early adulthood. Executive function also improves in adulthood, and inadequate development of this capacity is associated with delinquency and other conditions of health and social significance. Little is known about the physiological changes that the prefrontal cortex undergoes in adolescence so as to mediate improved cognitive control. Taking advantage of recent methodological and conceptual advances, we propose to investigate the changes of prefrontal cortical physiology and anatomical connectivity that occur after puberty. We propose to use a non-human primate model that will allow us to conduct behavioral assessments, neurophysiological recordings, and MR imaging in the prefrontal cortex of developing animals and controls. Our study will make use behavioral tasks that test response inhibition. We will rely primarily on the anti-saccade task which requires subjects to make an eye movement in the opposite direction of a visual stimulus, thus resisting the pre-potent stimulus. Experiments will record neuronal activity related to task performance to understand what neural variables maturate after the onset of puberty. These experiments will offer insights on how development of the prefrontal cortex alters its physiological responses, findings that will be essential for understanding and treating mental illnesses thought to be associated with a failure of prefrontal cortical maturation.

Role: Co-Investigator

13. NIA RF1AG058829 (PI: Shively) Jun 2018-Jul 2023

Effects of Western and Mediterranean Diets on Metabolic and Neuropathologic Risk Factors for Alzheimer's Disease in Nonhuman Primates

This study examines the effects of diet on peripheral metabolism and central nervous system (CNS) phenotypes and pathways implicated in early-stage Alzheimer's disease (AD) pathology in nonhuman primates (NHPs). Our overarching hypothesis is that, compared to a Western diet, consuming a Mediterranean diet protects against neuropathologic, vascular, inflammatory, oxidative, and other phenotypes associated with increased risk of AD. Our Specific Aims are to determine effects of Western and Mediterranean diets on: AD neuropathology, neurovascular pathophysiology, neuroinflammation, oxidative stress, and gene expression to identify the peripheral mediators of diet effects on the CNS, and novel pathways and mechanisms which may be involved in diet/AD interactions.

GRANTS CONTINUED…

Role: Co-Investigator - Director of Neuroimaging

14. NIAAA P50AA026117 (PI: Weiner) Dec 2017-Nov 2022
Wake Forest Translational Alcohol Research Center (WF-TARC)
The overarching research goal of this P50 Center is to identify neural adaptations and circuits that underlie vulnerability (and resilience) to AUD. Each project will evaluate novel interventional strategies targeted at the neural substrates that contribute to AUD vulnerability. These projects will use well-validated animal and human models and employ cutting-edge, multidisciplinary experimental approaches spanning molecular, cellular, circuit, and whole-brain analyses.
Role: Co-Investigator - Director of Non-Human Primate Imaging

15. NCI P01CA207206 (PI: Debinski) Aug 2017-Jul 2022
Maximizing local access to therapeutic deliveries in GBM
The aims of the image processing core are to: 1) utilize non-invasive imaging to diagnose GBM, evaluate longitudinal progression, and response to therapy, 2) directly radiolabel our novel targeted therapeutics and evaluate long-term biodistribution and tumor targeting, and 3) image loco-regional therapy administration to ensure proper placement of our advanced delivery vehicles and proper therapeutic distribution.
Role: Co-Investigator - Director of Brain Tumor Imaging

16. T32DA041349 (PI: Jones) Jul 2017-Jun 2022
The Neurobiology of Drug Abuse
Training the next generation of scientists to carry on research in substance abuse is a critical goal of the National Institute on Drug Abuse. This revised T32 training grant continues the long tradition of training predoctoral researchers at Wake Forest School of Medicine in designing studies to understand the neurobiological changes that occur in brain to mediate the process of drug addiction.
Role: Research Faculty

17. NIA R01AG055122 (PI: Craft) May 2017-Apr 2022
Modified Ketogenic Diet Effects on AD Biomarkers and Cognition in Mild Cognitive Impairment
This application proposes a Phase II study to determine the safety and efficacy of a ketogenic diet (KD) as a therapy for amnestic mild cognitive impairment (aMCI). Several mechanisms thought to underlie KD efficacy have also been implicated in the pathogenesis of Alzheimer's disease (AD), including reduction of neuronal hyperexcitability through glutamatergic inhibition, enhancement of mitochondrial metabolism with reduced oxidative stress, and inhibition of the mammalian target of rapamycin (MTOR). We will investigate diet effects on AD biomarkers, on cognition, on neuroimaging measures of metabolism, vascular function and connectivity, and on CSF/blood epigenetic, exosome, and omic markers. As such, it will provide important information to guide the design of a future Phase III study and to identify novel biomarkers and therapeutic targets that may enhance precision medicine approaches to diet and AD risk.
Role: Co-Investigator - Director of Neuroimaging

18. NIA R01AG054491 (Subcontract PI: Wagenknecht) Sep 2016-May 2021
The Role of Intracranial Atherosclerosis in the Development of Alzheimer's Disease.
We propose to prospectively study the role of intracranial atherosclerotic disease and its progression in the development of cognitive decline, mild cognitive impairment and dementia, in particular Alzheimer's Disease. Our primary aims are to determine if intracranial atherosclerotic disease presence and progression via MRI lead to cognitive decline, incident mild cognitive impairment and incident dementia. We will also determine if intracranial atherosclerotic disease adds to the predictive value of

GRANTS CONTINUED…

regional brain volume loss, a known predictor of Alzheimer's Disease. Finally, we will establish risk factors and plaque features that predict progression of intracranial atherosclerotic disease.
Role: Co-Investigator - Neuroradiologist

19. NIA R01AG040282 (Subcontract PI: Wagenknecht) Sep 2016-Apr 2021
The Atherosclerosis Risk in Communities (ARIC) -PET Amyloid Imaging Study.
This study proposes a repeat brain MRI and florbetapir (amyloid) PET scan among all surviving non-demented participants of ARIC-PET, to evaluate how vascular risk factors and brain subclinical vascular changes and APOE genotype each contribute to the progression of brain amyloid as well as the progression of clinical cognitive status, including conversion to mild cognitive impairment and dementia. Further, we will evaluate progression of brain cerebrovascular changes as a risk factor for progression of brain amyloid and clinical cognitive status, which we hypothesize may provide a critical link to explain some of our observed racial disparities in amyloid deposition rates.
Role: Co-Investigator - Neuroradiologist

20. NIA P30AG049638 (PI: Craft) Sep 2016-Aug 2021
Wake Forest Alzheimer's Disease Core Center
Our new Alzheimer's Disease Core Center (ADCC) at Wake Forest School of Medicine will provide a comprehensive infrastructure for translational, interdisciplinary research on the pathophysiology, prevention, and treatment of AD and related disorders. Our ADCC will focus on the transition from normal aging to mild cognitive impairment and then to AD and other dementias, and understanding the contribution of metabolic and vascular factors to these transitions.
Role: Co-Investigator and Co-Director of Neuroimaging Core

21. Alzheimer's Association Research Fellowship Program (PI: Kim) Jul 2016-Jun 2019
Analysis of brain degeneration in MCI using a biomechanical framework
We will apply biomechanical theory that takes account of volumetric, directional and shear deformations together, and test the hypothesis that directionally different brain degeneration patterns are detectable between adults with MCI and normal controls (NC). For this investigation, we predict that the direction of atrophy in MCI will be related to the orientation of the white matter tracts in the temporal lobe. We will test the feasibility of biomechanical metrics proposed in this study for sensitive detection of MCI progression/prevention using the MRI dataset from the NIA-funded multi-site 12-month randomized controlled trial of aerobic exercise versus a stretching control in adults with amnestic mild cognitive impairment.
Role: Primary Research Faculty Mentor for Dr. Jeongchul Kim

22. NSF Proposal#1559700 (PI: Weaver) May 2016-Apr 2019
REU Site: Imaging and Mechanics-based Projects on Accidental Cases of Trauma (IMPACT)
This research experiences for undergraduates (REU) site at Wake Forest University (WFU) School of Medicine offers multidisciplinary biomedical engineering opportunities involving accidental trauma research that aim to prevent, mitigate, and improve the fundamental understanding of injury. Objectives of this REU program emphasize research training, education, mentorship, and focus on inspiring under-represented students to pursue biomedical research and career opportunities.
Role: Research Faculty Mentor

23. R01NS058949 (PI: Brashear) Apr 2015-Mar 2020
Clinical, Genetic, And Cellular Consequences of Mutations in Na,K-ATPase ATP1A3
This project addresses a fundamental question in neuroscience. How do mutations in ATP1A3 affect neural networks in the brain and cause a spectrum of disease in children and adults? The current barriers are first, recognition/diagnosis of the rare diseases caused by ATP1A3 mutation, and second,

GRANTS CONTINUED…

treatment of patients with devastating and irreversible neurologic deficits. Based upon our work in funding cycle (FC1) and given the increasing number of de novo mutations, ATP1A3 mutations are likely under-reported. This gives us an opportunity to define an intermediate phenotype between AHC and RDP.
Role: Co-Investigator - Director of Neuroimaging

24. NCATS UL1TR001420 (PI: McClain) Aug 2015-Mar 2019
Wake Forest Clinical and Translational Science Award (CTSA)
The mission of the Wake Forest Translational Science Institute (TSI) is to provide an innovative, efficient, and sustainable research infrastructure to accelerate WF's transformation, and thus speed the translation of discoveries to improve health. We propose novel experimental approaches that will test methodologies to advance the science of translational science. We will leverage our comprehensive infrastructure to fund new pilot projects and new multidisciplinary research teams, as well as offer innovative training to help those ventures succeed. In summary, the TSI is poised to be a productive hub within the CTSA network.
Role: Co-Investigator - Director of the Translational Imaging Program

25. NINDS R01NS082453 (PI: Stitzel) Jul 2014-Jun 2019
iTAKL: Imaging Telemetry And Kinematic modeLing - youth football
This study will relate information about head motion during impact in youth football leagues (8-12 years old) to neurocognitive and imaging data to determine the effects of subconcussive mechanical force, and the true incidence of cognitive and objective imaging changes. The overall aim of this investigation is to increase our understanding of pediatric mild traumatic brain injury (mTBI) by prospectively collecting and analyzing biomechanical, neuroimaging, neurocognitive and computational modeling data.
Role: Director of Neuroimaging

Ongoing Pilot Projects

1. Pilot Study of R01 NS075107 (PI: **Whitlow**) Jul 2016-Present
Cellular Microparticles: Blood-Borne Biomarker of Vascular Pathology in Diabetes.
The goal of this study is to develop a blood-borne biomarker of diabetes-induced vascular pathology based on a cellular microparticle (MP) marker of angiogenesis. MPs are small blood-borne cell fragments shed from the surface of blood cells and vascular endothelial cells after activation. MPs can be obtained by venous blood draw, extracted by centrifugation, labeled by fluorescent markers, and examined by flow cytometry. The angiogenesis MP marker is a specific isoform of aminopeptidase N not found on normal endothelial cells. This marker is being used in clinical trials todeliver drugs to angiogenic blood vessels in tumors. The primary aim of our study will be to demonstrate early stage proof-of-concept, formulation of reagents, optimization of procedures, and clinical interpretation of the biomarker. Specifically, we will develop fluorescently-tagged peptide reagents to stain MPs. This biomarker can be used to survey for vascular disease that involves reactive angiogenesis.
Role: Principal Investigator

PAST GRANT HISTORY:

1. R01NS075107 (Co-I: **Whitlow**) Jun 2011-Apr 2018
Cerebrovascular Disease and Cognitive Performance in African Americans.
This project will evaluate cerebrovascular disease (CBVD) in African Americans (AA) with type 2 diabetes, and compare results to existing MRI and cognitive data in a cohort of European Americans with type 2 diabetes. The goal is to determine whether racial differences exist in the relationship

GRANTS CONTINUED…

between CBVD and cognitive performance and to identify the environmental and inherited causes of CBVD in the high risk and understudied AA population.
Role: Co-Director of Neuroimaging

2. DARPA-N66001-14-C-4016 (Co-I: Whitlow) Feb 2014-Jun 2018
RAM: Restoring Active Memory
Development of a computational model of neurobiological mechanisms underlying memory in humans. Restoration of multiple types of complex memories in human and animal models.
Role: Director of Neuroimaging (5% effort)

3. RSNA GTS# 42921 (Faculty Advisor: **Whitlow**) Sep 2015-Feb 2016
Relationships Between Whole Brain Functional Connectivity Metrics and Cognitive Function in African Americans with Type II Diabetes
Although rates of type 2 diabetes (T2D) are higher among African Americans, few studies have characterized the effects of diabetes on brain network connectivity, which may underlie cognitive function in this understudied population. Thus, the purpose of this study was to determine the relationship between functional magnetic resonance imaging measures of brain network connectivity and cognitive function in an African American population with T2D enrolled in the NIH-funded African American-Diabetes Heart Study MIND (R01 NS075107).
Role: Research Faculty Mentor Mentor/Advisor for medical student (Daniel Cook) (0% effort)

4. R37AG010880 (Consultant: **Whitlow**) Jun 2013-May 2016
Glucose Regulation and Memory in Alzheimer's Disease
Our continuing focus is insulin resistance (i.e., high plasma insulin levels and reduced insulin effectiveness) as an antecedent or risk factor for Alzheimer's disease. A key hypothesis posits that a specific form of insulin resistance, one that is associated with hypertension (hereafter, termed hypertension-associated insulin resistance or "HAIR"), interferes with peripheral and brain vascular function, and p-amyloid regulation.
Role: Neuroimaging Consultant

5. R03NS088082 (Faculty Advisor: **Whitlow**) Jun 2014-Aug 2015
Sports Related Subconcussive Impacts in Children: MRI & Biomechanical Correlate
In this R03 we will investigate the biomechanical and cognitive correlates of diffusion MRI scalar measures of mTBI in children. This project leverages the investments by Wake Forest University Health Sciences which has identified, instrumented and enrolled youth football players, and funded the data collection as part of our ongoing work in this area of critical public importance.
Role: Research Faculty Mentor/Advisor for graduate student (Naeim Barhmi) (0% effort)

6. R01HL098445 (Subcontract-PI: **Whitlow**) Dec 2013-Apr 2014
Longitudinal Changes in Pericardial Adiposity and Subclinical Atherosclerosis
Obesity in early life in African American and white adults is a factor in premature heart disease and cardiovascular death. We will leverage an existing study of 5,115 individuals with 25 years of follow-up to make new measurements with CT and echocardiography. We will determine how changes in the fat located around the heart over ten years in adults 33-55 years influences subsequent heart disease.
Role: Principal Investigator-WFUHS Subcontract (2% effort)

7. TSI KL2 (Whitlow, PI, 75% effort) Oct 2011-Dec 2013
Identifying Novel Brain Anatomical Biomarkers of Preterm Birth That Predict Future Cognitive Impairment: A Graph Theoretical Network Analysis and Machine Learning Investigation.

GRANTS CONTINUED…

The purpose of this study is to identify preterm-birth associated biomarkers predictive of future cognitive impairment using structural MRI combined with machine learning and network connectivity analyses.
Role: Principal Investigator

8. ASNR Research Fellowship (PI: **Whitlow**) 07/2009-06/2011
Evolving Patterns of Network Connectivity in the Developing Brain: An MRI and Computational Network Analytical Investigation.
The purpose of this study is to identify age-associated temporal changes in brain connectivity during the first 3 years of life that underlies brain maturation by combining MRI and graph theoretical analysis.
Role: Principal Investigator (50% effort)

9. RSNA RR0724 (PI: **Whitlow**) Jul 2007-Jun 2009
Percutaneous Femoroplasty for Preventing Hip Fracture: Procedural Development and Finite Element Analysis.
The purpose of this proposal is to develop and investigate a new relatively inexpensive minimally invasive image guided procedure for preventing hip fractures due to falls. We hypothesize that augmentation of osteoporotic femoral necks by controlled economic delivery of polymethylmethacrylate bone-cement, termed femoroplasty, will be mechanically effective in reducing stresses in the femoral neck under fall conditions.
Role: Principal Investigator (50% effort)

10. NIH NRSA F30DA05911 (PI: **Whitlow**) Sep 1998-Aug 2004
Neural Substrates and Cognitive Effects of Cannabinoids: A Translational Neuroimaging Approach.
The purpose of this proposal is to characterize the primary neuroanatomical substrates affected by the cannabinoid agonist, delta 9-tetrahydrocannabinol. A translational neuroimaging model will be used in which initial functional neuroimaging data (2-[14C] deoxyglucose autoradiography) from a well-controlled laboratory animal model guides subsequent functional magnetic resonance imaging investigations in human subjects with chronic cannabinoid exposure.
Role: Principal Investigator (100% effort)

PATENTS

Application # 62425920 **MEDICAL IMAGE ANALYSIS USING MECHANICAL DEFORMATION**
INFORMATION: Medical image analyses that employ finite strain theory of continuum mechanics to estimate strain tensors for evaluating directional changes (stretch, shrink/compression and/or shear strain) of one or more voxels in medical images of a subject taken over time.

PRESENTATIONS AT PROFESSIONAL MEETINGS

Society for Neuroscience 25th Annual Meeting, San Diego, California 1995
"Kappa opioid receptor agonist blocks potassium- stimulated increase in extracellular glutamate levels in rat striatum'

Research Society on Alcoholism 20th Annual Meeting, San Francisco, California 1997
'Neuroanatomical substrates underlying the discrimination of ethanol from water'

PRESENTATIONS CONTINUED…

Society for Neuroscience 27th Annual Meeting, New Orleans, Louisiana 1997
'The novel cocaine analog, [3H]PTT, as a functional marker of the dopamine transporter'

Research Society on Alcoholism 21st Annual Meeting, Hilton Head, South Carolina 1998
'Contribution of 5-HT3 activity to the effects of ethanol on rates of local cerebral glucose utilization in rats'

International Cannabinoid Research Society, 8th Annual Symposium on the Cannabinoids, La Grande-Motte, France 1998
'Metabolic mapping of the time-dependent effects of Δ9-tetrahydrocannabinol in rats'

Society for Neuroscience 28th Annual Meeting, Los Angeles, California 1998
'Effects of D1 and D2 antagonists on the functional consequences of ethanol in rats'

Society for Neuroscience 29th Annual Meeting, Miami Beach, Florida 1999
'Effects of Δ9-tetrahydrocannabinol on local cerebral glucose utilization'

International Cannabinoid Research Society, 9th Annual Symposium on the Cannabinoids, Acapulco, Mexico 1999
'Effects of Δ9-tetrahydrocannabinol on local cerebral glucose utilization'

Wake Forest University School of Medicine Annual Medical Student Research Day, Winston Salem, North Carolina 1999
'Persistent effects of the acute administration of Δ9-tetrahydrocannabinol on rates of local cerebral glucose utilization in the rat'

Society for Neuroscience 30th Annual Meeting, New Orleans, Louisiana 2000
'Dose-related effects of Δ9- tetrahydrocannabinol on local cerebral glucose utilization'

International Cannabinoid Research Society, 11th Annual Symposium on the Cannabinoids, San Lorenzo de El Escorial, Spain 2001
'Effects of SR141716A on rates of local cerebral glucose utilization'
'Chronic effects of Δ9-tetrahydrocannabinol on rates of local cerebral glucose utilization in Rats'

Society for Neuroscience 31st Annual Meeting, San Diego, California 2001
'Metabolic mapping of the effects of the acute administration of the cannabinoid receptor antagonist SR141716A in rat'
'Functional consequences of the repeated administration of Δ9-tetrahydrocannabinol'

The College on Problems of Drug Dependence 64th Annual Meeting, Québec, Canada 2002
'Effects of CP55,940 on rates of local cerebral glucose utilization in the rat'

Society for Neuroscience 32nd Annual Meeting, Orlando, Florida 2002
'Long-term cannabis users employ different decision-making strategies than controls in a risk-taking task'

The College on Problems of Drug Dependence 65th Annual Meeting, Bal Harbour Florida 2003
'Decision-making in heavy marijuana users: an fMRI study'

PRESENTATIONS CONTINUED…

American Society of Neuroimaging 26th Annual Meeting, New Orleans, Louisiana 2003
'Magnetic Resonance Imaging of brain and muscle in a case of ecstasy (methylenedixoymethamphetamine {MDMA}) related neuroleptic malignant syndrome'

Radiological Society of North America's 90th Scientific Assembly and Annual Meeting, Chicago, Illinois 2004
'Investigating sacroplasty: Technical considerations and biomechanical properties of sacral polymethylmethacrylate infusions in cadaveric pelvic specimens'

American Society of Neuroradiology 43rd Annual Meeting, Toronto, Ontario, Canada 2005
'Utility of transcranial doppler monitoring during Wada testing and potential applications to therapeutic endovascular procedures'

Radiological Society of North America's 91st Scientific Assembly and Annual Meeting, Chicago, Illinois 2005
'Fluoroscopy-guided percutaneous injection of polymethylmethacrylate into cadaveric hip: A possible prophylactic treatment for individuals at risk for hip fracture'

American Society of Neuroradiology 44th Annual Meeting, San Diego, California 2006
'Sacroplasty versus vertebroplasty: Comparable clinical efficacy for the treatment of fracture-related pain'

American Society of Neuroradiology 45th Annual Meeting, Chicago, Illinois 2007
'Ultra-thin gold and vitronectin coating on platinum show enhanced neointimal response compared with platinum in a rat aneurysm model'

American Society of Functional Neuroradiology 2nd Annual Meeting, Orlando, Florida 2008
'Age-related changes in global rates of cerebral perfusion in normal children, adolescents, and young adults: A magnetic resonance arterial spin labeling investigation'

American Society of Functional Neuroradiology 2nd Annual Meeting, Orlando, Florida 2008
'Time-dependent changes in cerebral perfusion associated with posterior reversible encephalopathy: A magnetic resonance arterial spin labeling investigation'

American Society of Neuroradiology 46th Annual Meeting, 2008, New Orleans, Louisiana 2008
'Changes in Global Rates of Cerebral Perfusion Associated with Normal Development as Measured with MR Arterial Spin Labeling'
'Temporal Changes in Cerebral Perfusion Associated with Posterior Reversible Encephalopathy Syndrome as Measured with MR Arterial Spin Labeling'
'Anoxic injury associated cerebral hyperperfusion identified with arterial spin labeled MR Impinging'

Radiological Society of North America's 94th Scientific Assembly and Annual Meeting, Chicago, Illinois 2008
'Endovascular histologic effects of ultra-thin gold coated platinum coil in a rodent model of saccular aneurysm: A preliminary investigation'
'Age-Related Changes in Global Rates of Cerebral Perfusion From Birth to Age 92: A Magnetic Resonance Arterial Spin Labeling Investigation'

American Society of Neuroradiology 47th Annual Meeting, Vancouver, British Columbia, Canada 2009
'Pulsed Arterial Spin-Labeled MR Imaging Evaluation of Tuberous Sclerosis'

PRESENTATIONS CONTINUED…

'Hypercapnia-induced cerebral hyperperfusion with arterial spin labeled MR imaging perfusion imaging: An under recognized clinical entity'

Radiological Society of North America's 95th Scientific Assembly and Annual Meeting, Chicago, Illinois 2009
'Effect of Constant Angle Insonation Versus Varied Angle Insonation on Measurement of Doppler Velocities'

Second Biennial International Conference on Resting-State Functional Brain Connectivity, Milwaukee, Wisconsin 2010
'Effect of resting-state fMRI-BOLD acquisition duration on small world networks'

American Society of Functional Neuroradiology 5th Annual Meeting, Phoenix, Arizona 2011
'Effect of resting-state fMRI BOLD acquisition duration on accuracy of computed graph theory metrics of brain network connectivity'
'Effect of resting-state fMRI repetition time on accuracy of computed graph theory metrics of brain network connectivity'

Cancer Imaging and Radiation Therapy Symposium: A Multidisciplinary Approach, Atlanta, Georgia 2011
'Characterization of glial cell intratumoral fMRI resting-state networks using graph theoretical analysis'
'Altered functional network connectivity in patients with brain tumors: A resting-state fMRI and graph theory investigation'
'Graph theory network metrics computed from clinical task-based fMRI acquired during presurgical motor and language mapping of patients with brain tumors'

International Society for Magnetic Resonance in Medicine 19th Annual Meeting, Montreal, Quebec, Canada 2011
'A new high-dimensional machine learning approach for identifying Alzheimer's Disease from MRI structural images'

American Society of Neuroradiology 49th Annual Meeting, Seattle, Washington 2011
'It's a small world after all: The application of graph theoretical analysis to the study of brain network connectivity' (invited talk)
'Effect of resting-state fMRI repetition time on accuracy of computed graph theory network metrics'
'Pulsed arterial spin labeling time-series data can be used to accurately compute graph theory metrics of global distributed brain connectivity'
'Characterization of glial cell intratumoral fMRI resting-state networks using graph theoretical analysis: A preliminary investigation'

7th Annual Injury Biomechanics Symposium (IBS), Columbus, Ohio 2011
'Semi-Automated Landmark Identification Using Label Maps in an MNI Atlas'

8th Annual World Congress of the International Brain Mapping & Intraoperative Surgical Planning Society (IBMISPS), San Francisco, CA 2011
'Generation of an MNI atlas in SIMon finite element head model space'

International Society for Magnetic Resonance in Medicine 20th Annual Meeting & Exhibition, Melbourne, Victoria, Australia 2012

PRESENTATIONS CONTINUED…

'Cerebral blood flow quantification in swine model using pseudo-continuous arterial spin labeling'

American Society of Neuroradiology 50th Annual Meeting, New York, New York 2012
'Glioblastoma multiforme progression or treatment-related pseudoprogression? A direct comparison of common MRI diffusion and perfusion sequences at the neuroradiology clinical workstation'
'Graph theoretical analysis applied to structural MRI data reveals disease-specific gray-matter changes in patients with diabetes mellitus'
'Arterial spin labeling perfusion MRI differentiates tumefactive demyelinating lesions from glioblastoma multiforme'
'Multimodal biological parametric mapping reveals the effect of gray-matter atrophy on positron emission tomography measures of hypometabolism associated with Alzheimer's disease'
'Combining clinical neuroimaging and real-world mechanical impact data to investigate motor vehicle crash-related subdural hematoma'
'Semi-automated landmark identification method used to quantify age-related shape change of brain structures'
'Combining graph theoretical analysis and conventional anatomical MRI: A new voxel-wise approach for constructing disease-specific structural brain networks applied to Alzheimer's disease'

American Society of Functional Neuroradiology 6th Annual Meeting, Orlando, Florida 2012
'Glioblastoma multiforme progression or treatment-related pseudoprogression? A direct comparison of common MRI diffusion and perfusion sequences at the neuroradiology clinical workstation'
'Graph theoretical analysis applied to structural MRI data reveals disease-specific gray-matter changes in patients with diabetes mellitus'
'Arterial spin labeling perfusion MRI differentiates tumefactive demyelinating lesions from glioblastoma multiforme'
'Multimodal biological parametric mapping reveals the effect of gray-matter atrophy on Positron emission tomography measures of hypometabolism associated with Alzheimer's disease'
'Combining clinical neuroimaging and real-world mechanical impact data to investigate motor vehicle crash-related subdural hematoma'
'Semi-automated landmark identification method used to quantify age-related shape change of brain structures'
'Combining graph theoretical analysis and conventional anatomical MRI: A new voxel-wise approach for constructing disease-specific structural brain networks applied to Alzheimer's disease'

American Neurological Association 137th Annual Meeting, Boston, MA 2012
'Rapid onset dystonia- Parkinsonism associated with the I758S ATP1A3 mutation: A neuropathologic study of three affected siblings'
'Structural abnormalities in the brain associated with rapid onset dystonia-Parkinsonism: A preliminary investigation'

American Society of Mechanical Engineering 2012 Summer Bioengineering Conference, San Juan, PR 2012
'Combining Clinical Neuroimaging and Real-World Impact Data to Investigate Motor Vehicle Crash-Related Subarachnoid Hemorrhage'

3rd Biennial Resting State Conference, Magdeburg, Germany 2012
'Brain intratumoral graph theory network metrics can be computed from resting-state signal and may vary by tumor histological subtype'

PRESENTATIONS CONTINUED…

'Graph theory network metrics can be accurately computed from clinical task- based fMRI signal acquired during routine presurgical motor and language brain mapping in patients with glial cell malignancies'
'Accurate graph theory metrics of brain network connectivity can be computed across a range of pulse sequence repetition times, including those used for clinical pulsed arterial spin labeling perfusion MRI'

Brain Tumor Center of Excellence 9th Annual Retreat, Winston-Salem, NC 2012
'Characterizing novel MRI features of brain tumors for use as imaging biomarkers of histology'

Biomedical Engineering Society (BMES) 2012 Annual Meeting, Atlanta, Georgia 2012
'Age-specific gray-matter changes in pediatric subjects is reveled by graph theoretical analysis applied to structural MRI data'
'Volumetric analysis of motor vehicle crash-related brain injuries from real-world head impact data'

Radiological Society of North America's 98th Scientific Assembly and Annual Meeting, Chicago, Illinois 2012
'Is CTA clinically useful in the evaluation of patients with acute headache suggestive of aneurysmal subarachnoid hemorrhage when the non-contrast head CT is negative?'
'Hierarchical level set with boosting for white matter lesion segmentation in diabetes'
'Evaluation of automated white matter lesion segmentation in diabetes'

IEEE 11th International Conference on Machine Learning and Applications (ICMLA), 2012
Boca Raton, Florida
'A machine learning pipeline for three-way classification of Alzheimer patients from structural magnetic resonance images of the brain'
'A novel hierarchical level set with AR-boost for white matter lesion segmentation in diabetes'

Alzheimer's Association International Conference (AAIC) 2012, Vancouver, British Columbia, Canada 2012
'Whither the hippocampus?: FDG-PET hippocampal hypometabolism in Alzheimer's disease revisited'
'Alzheimer's disease–specific changes in cerebral gray matter revealed using a novel voxel-wise approach for constructing structural brain networks'

American Society of Functional Neuroradiology 6th Annual Meeting, Charleston, South Carolina 2013
'An automated MEG resting-state analysis pipeline'
'Graph theoretic MEG resting-state networks'
'Stationarity of MEG and fMRI resting-state signal'
'Advanced Resting State Analysis and Research Applications: PCA, ICA, Graph Theory'
'Investigation of pediatric MEG networks using meta-ICA'
'Delta wave detection in MEG data of high school football players'

American Society of Pediatric Otolaryngology Meeting, Arlington, Virginia 2013
'Computed tomography demonstrates abnormalities of contralateral ear in subjects with unilateral sensorineural hearing loss'

Rocky Mountain Bioengineering Symposium (RMBS), Colorado Springs, Colorado 2013
'Evaluation of the extent and distribution of diffuse axonal injury from real world motor

PRESENTATIONS CONTINUED…

vehicle crashes'

American Society of Neuroradiology 51st Annual Meeting, San Diego, California 2013
'Investigation of pediatric MEG networks using meta-ICA'
'Delta wave detection in MEG data of high school football players'

American Society of Pediatric Otolaryngology Annual Meeting, Washington DC 2013
'Computed tomography demonstrates morphologic abnormalities of the contralateral ear in subjects with unilateral sensorineural hearing loss'
'Computed tomography supports histopathologic evidence of vestibulocochlear sexual dimorphism'

American Heart Association's Nutrition, Physical Activity and Metabolism and Cardiovascular Disease Epidemiology and Prevention 2013 Scientific Meeting. New Orleans, Louisiana 2013
'Subclinical atherosclerosis and cognitive functioning in middle-aged black and white adults'

Advanced Technologies and New Frontiers in Brain Injuries and Biomechanics, Washington DC 2013
'Neuroimaging and mild TBI'

The American Academy of Neurology's 65th AAN Annual Meeting, San Diego, California 2013
'Rapid-Onset Dystonia- Parkinsonism Presenting as Tremor-Dominant Parkinson's Disease'

Second Symposium on ATP1A3 in disease, Rome, Italy 2013
'Imaging results in RDP provide potential insights'

11th Annual American Medical Association Research Symposium, National Harbor, Maryland 2013
'V: Are there really no subtypes of schizophrenia anymore? Insights from MRI'

Radiological Society of North America's 99th Scientific Assembly and Annual Meeting, Chicago, Illinois 2013
'An algorithmic approach towards the evaluation of hypoxic-ischemic encephalopathy (HIE) in pediatric patients'

Biomedical Engineering Society (BMES) Annual Meeting, 2013, Seattle, Washington 2013
'Head impact exposure in youth football: elementary school ages 9 to 12 years and the effect of practice structure'
'Head impact exposure measurements in pediatric populations'

American Academy of Neurology Sports Concussion Conference Poster Session, Chicago, IL 2014
'A Risk Weighted Cumulative Exposure Metric for the Analysis of Head Impact Data'

13th Annual Graduate Student Research Symposium, Winston Salem, NC 2014
'Head Impacts and White Matter Changes in High School Football: A TBSS Analysis'
'Classifying Head-Impact Related Changes in Brain Connectivity a Support Vector Machine Recursive Feature Elimination Approach After a Single Season of High School Football'
'Abnormal White Matter Integrity Related to Head Impact Exposure in a Season of High School Varsity Football'

American Society of Functional Neuroradiology 7th Annual Meeting, Miami, Florida 2014
'Interhemispheric Connectivity Changes Associated with a Season of High School Football'
'Impact Location Relates to Areas of Increased Delta Wave Power in MEG Data of High School Football Players'

PRESENTATIONS CONTINUED…

'White Matter Integrity Changes and Head Impact Exposure in a Season of High School Varsity Football'
'Patterns of Structural Co-Variance Associated with Autism Spectrum Disorder in Extremely Preterm Neonates: A Novel Voxel-Wise Graph Theoretic Approach'
'Advanced Resting State Analysis and Research Applications: PCA, ICA, Graph Theory'
'Graph Theoretic Connectivity Analysis of MEG data'

American Society of Pediatric Otolaryngology, Las Vegas, Nevada 2014
'Relationships of audiometric patterns in "idiopathic" hearing loss to subtle radiographic findings in "normal" temporal bone computed tomography'

American Society of Neuroradiology 52nd Annual Meeting, Montreal, Quebec, Canada 2014
'Magnetoencephalographic Delta Wave Changes Related to Impact Location in High School Football'
'White Matter Integrity Changes and Head Impact Exposure in a Season of High School Varsity Football'
'Interhemispheric Connectivity Changes Associated with a Season of High School Football'
'Patterns of Structural Co-Variance Associated with Autism Spectrum Disorder in Extremely Preterm Neonates: A Novel Voxel-Wise Graph Theoretic Approach'
'Imaging the neonatal brain: Advanced MRI methods and analysis techniques'

American Society of Functional Neuroradiology 7th Annual Meeting, Miami, Florida 2014
'Graph Theoretic Connectivity Analysis of MEG data'

American Roentgen Ray Society Annual Meeting, San Diego, CA 2014
'Metabolic syndrome and Alzheimer's Disease: Exploring the role of obesity in the development of cognitive impairment using fMRI DMN output'

American Association of Neurological Surgeons, San Francisco, CA 2014
'Abnormal White Matter Integrity Related to Head Impact Exposure in a Season of High School Varsity Football'

International Brain Injury Association Tenth World Congress on Brain Injury, San Francisco, CA 2014
'Development of a Risk Weighted Cumulative Exposure Metric for the Analysis of Head Impact Data'

Hit Count Symposium, Washington DC 2014
'Development of a Risk Weighted Cumulative Exposure Metric for the Analysis of Head Impact Data'

International Society for Magnetic Resonance in Medicine 23rd Annual Meeting, Milan, Italy 2014
'Frontal Lobe Interhemispheric Connectivity Changes Associated with a Season of High School Football'

Pediatric Academic Societies Annual Meeting, Vancouver, BC 2014
'Autism spectrum disorder in ex- preterms is preceded by altered neonatal brain volumes and structural covariance'

International Society for Magnetic Resonance in Medicine Scientific Workshop. Functional MRI: Emerging Techniques & New Interpretations, 2014, Charleston, SC 2014

PRESENTATIONS CONTINUED…

'Clinical Perspectives in fMRI: Current state of neuroradiologic applications for patient care'
'Classifying TBI-associated changes in interhemispheric network connectivity among high school football players using support vector machine recursive feature elimination'

Biomedical Engineering Society Fall Scientific Meeting, San Antonio, Texas 2014
'TBSS analysis of white matter changes related to head impacts in high school football'
'Axonal water fraction is related to head impact exposure in high school varsity football players'
'Classifying head-impact related changes in brain connectivity after a single season of high school football: A support vector machine recursive feature elimination approach'
'Morphological changes in the adult skull with age and sex'
'SVM-RFE for distinguishing fMRI interhemispheric networks between big and little hitters in a single football season'

Society for Neuro-Oncology Annual Meeting, Miami, Florida 2014
'Cellular microparticles as blood-borne endothelial biomarkers in patients with malignant gliomas'

Radiological Society of North America, Chicago, IL 2014
'Head Impacts and White Matter Changes in High School Football: A TBSS Analysis'

International Society for Magnetic Resonance in Medicine 23rd Annual Meeting, Toronto, ON, Canada 2015
Genomics, Proteomics, & Big Data Course:
'Managing Big Data from MRI: the Neuroradiologist's Perspective'
'Effects of linear and rotational head impact on white matter changes in high school football players'
'Effect of head impact exposure on microstructural development of white matter tracts in a season of high school varsity football'
'Diffusion changes in cerebellar white matter microstructure related to head impact exposure in a season of high school varsity football'

American Society of Neuroradiology 53nd Annual Meeting, Chicago, IL 2015
'Head impact exposure in a season of youth football increases MEG low frequency brain waves'
'Non-concussive cumulative head impact-associated abnormalities in brain gray matter after a single season of varsity high school football: practices versus games'
'Diffusional kurtosis imaging reveals head-impact associated changes in brain white matter after a single season of varsity high school football'
'FMRI connectivity network changes associated with a season of high school football'
'Discriminating between pre- and post-season fMRI connectivity networks after a single season of high school football: a machine learning study'
'Brain structural network changes related to head impact in youth football'
'Effects of head impact exposure on the internal and external capsule regions of white matter in high school varsity football players'
'Normative Databases and Machine Learning: Does it Matter for Neuroradiology?'

American Society of Functional Neuroradiology 9th Annual Meeting, Tucson, AZ 2015
'Classification of pre- and post-season resting- state fMRI networks after a single season of high school football'
'Effects of subconcussive head impacts in a single season of high school football on resting-state fMRI connectivity networks'

PRESENTATIONS CONTINUED…

'Brain structural network changes related to head impact in youth football'
'Season of youth football increases MEG low frequency brain waves'
'PCA, ICA, Graph Theory'
'Dynamic resting state'
'Brain structural network changes related to head impact in youth football'

SBES Symposium, Blacksburg, VA 2015
'Effects of subconcussive head impacts in a single season of high school football on resting-state fMRI connectivity networks'

American Society for Radiation Oncology 57th Annual Meeting, San Antonio, TX 2015
'A comprehensive assessment of radiographic, clinical, and treatment related risk factors for metastasis related intracranial hemorrhage in metastatic melanoma following radiation therapy'

Biomedical Engineering Society (BMES) Annual Meeting, Tampa, FL 2015
'Development of a computer model for an innovative magnetoencephalography (MEG) brain phantom'
'Diffusion changes in cerebellar white matter microstructure related to head impact exposure in a season of high school varsity football'
'Effect of head impacts on white matter fiber tracts in youth football'

American Society of Functional Neuroradiology 10th Annual Meeting, Austin, TX 2016
'MEG Low-Frequency Brian Waves Increase After a Season of High School Football'
'3D Printed MEG Phantom Design and Construction for Validation of MEG Source Localization'
'Type-2 diabetes disease duration among African-Americans is associated with brain structural white matter changes'
'Picture memory performance and microstructural changes in the inferior longitudinal fasciculus associated with subconcussive head Impacts in youth football'

'Microstructural changes in corpus callosum associated with subconcussive head impact exposure in youth football'
'Brain developmental changes in MEG-recorded delta wave activity across youth and adolescence'
'Effects of glycemic control on cerebral blood flow vary by sex in African-Americans with type-2 diabetes: The African- American Diabetes Heart Study MIND'

Keystone Symposium on Traumatic Brain Injury: Clinical, Pathological, and Translational Mechanisms of TBI, Santa Fe, NM 2016
'Cumulative Head Impact Exposure in Youth Football Players'

International Neuropsychological Society Conference (NS), Boston, MA 2016
'Subconcussive Related Changes in High School Football Player Reaction Time'

International Brain Injury Association (IBIA) - Eleventh World Congress on Brain Injury, Hague, Netherlands 2016
'Effects of cumulative subconcussive head impact exposure associated with youth football on white matter microstructural integrity'

American Society of Neuroradiology 54th Annual Meeting, Washington, DC 2016
'Construction of a 3D Printed MEG Phantom for Validation of MEG Source Localization'
'Cumulative Subconcussive Head Impact Exposure in Youth Football Results in Microstructural

PRESENTATIONS CONTINUED…

Changes in Corpus Callosum Purpose'
'Brain developmental changes in MEG-recorded delta wave activity across youth and adolescence'
'Sex Differences in the Association Between Glycemic Control and Cerebral Blood Flow in African Americans with Type-2 Diabetes: The African-American Diabetes Heart Study MIND'
'Brain Micro-hemorrhages by Susceptibility Weighted Imaging after a Season of High School Football'

Biomedical Engineering Society (BMES) Annual Meeting, Minneapolis, MN 2016
'Cumulative head impact exposure on off season DTI and DKI changes in youth football athletes'
'Brain white matter orientation dispersion changes associated with subconcussive head impact exposure after a single season of youth football'

Fifth Symposium on ATP1A3 in Disease, London, England 2016
'Associations between brain structure and executive function in patients with rapid-onset dystonia-parkinsonism'

American Association of Physicists in Medicine (AAPM) 58th Annual Meeting & Exhibition, Washington, DC 2016
'New arterial spin labeling method for simultaneous estimation of arterial cerebral blood volume, cerebral blood flow and arterial transit time'
'Size selective arterial cerebral blood volume mapping using multiple inversion time arterial spin labeling'

Alzheimer's Association International Conference, Toronto, Ontario, Canada 2016
'APOE E4 allele effect on vascular reactivity measured by breath-hold arterial spin labeling in normal and memory-impaired adults'

Radiological Society of North America's 102nd Scientific Assembly and Annual Meeting, Chicago, IL 2016
'Associations between whole brain network connectivity and cognitive function in African Americans with type 2 diabetes mellitus: A resting-state functional MRI graph theoretical analysis'
'Relationship between MEG and diffusion imaging measured changes over a season of high school football'
'Non-invasive 1H MR oximetry imaging of human brain tumors at 3T"

Annual Meeting of the American Neurological Association, Baltimore, MD 2016
'Associations between brain structure and executive function in patients with rapid-onset dystonia-parkinsonism'

Orthopedic Research Society Annual Meeting, San Diego, CA 2017
'Investigating percutaneous femoroplasty to optimize polymethylmethacrylate injection volume and configuration'

Annual Meeting of the American Academy of Neurology, Boston, MA 2017
'Associations between brain structure and motor-related manifestations of rapid-onset dystonia-parkinsonism'

Alzheimer's Association International Conference, London, England 2017
'Effects of dietary saturated fats and simple carbohydrates on cerebral perfusion: A randomized trial'
'Effects of aerobic exercise on functional connectivity of prefrontal cortex in MCI: Results of a randomized controlled trial'
'Biomechanical characterization of brain atrophy in cognitively normal and MCI groups'

PRESENTATIONS CONTINUED…

'APOE ε4 allele effect on white and gray matter perfusion in cognitively normal and MCI groups'

Biomedical Engineering Society (BMES) Annual Meeting, Phoenix, AZ 2017
'Effects of anthropometric and environmental variables on biomechanical measures of head impact exposure in youth football players'
'Changes in head impact exposure over consecutive seasons among individual youth football players'
'Regional distribution and time-course of changes in abnormal delta wave activity following a single season of high school football'

The International Society for Magnetic Resonance in Medicine, Honolulu, HI 2017
'Longitudinal Analysis of Rhesus Monkey Brain Development Using MRI and Tensor-Based Morphometry'
'Effects of cumulative non-concussive head impact exposure associated with youth football on MRI measures of gray matter structure'

American Society of Functional Neuroradiology 11th Annual Meeting, Portland, OR 2017
'Time-course of regional cerebral changes in MEG delta-wave activity associated with repetitive non-concussive football related head impact exposure among adolescents'
'Dosimetric and MRI spatial analysis of predictors of local failure following stereotactic radiosurgery for melanoma brain metastasis'
'Non-concussive football-related head impact exposure is associated with changes in cerebral blood flow of deep gray nuclei in the pediatric population'
'Changes in gray matter microstructural integrity associated with repetitive non-concussive head impact exposure in youth football'
'Longitudinal analysis of rhesus monkey brain development using MRI'

Radiological Society of North America's 103rd Scientific Assembly and Annual Meeting, Chicago, IL 2017
'Intra-default mode network connectivity changes from a single season of youth football distinguish levels of head impact exposure'
'MEG measured default mode network is altered by history of concussion in high school football'

Biomedical Engineering Society (BMES) Annual Meeting, Atlanta, GA 2017
'Intra-default mode network connectivity changes from a single season of youth football distinguish levels of head impact exposure'
'Evaluating Head Impact Exposure in Practice Drills Among Multiple Youth Football Teams'
'The Relationship between Strain-Based Cumulative Exposure and Changes in White Matter Integrity among High School Football Players'
'Acute Effects of Concussion on Cerebral Blood Flow in Frontal Cortex among Adolescent Football Players'
'Cerebral Blood Flow Changes Associated with Repetitive Head Impact Exposure in Youth Football'

American Society of Neuroradiology 56th Annual Meeting, Vancouver, BC, Canada 2018
'Automatic detection of fiducial markers in MRI images using 2-D convolutional neural networks for MEG coregistration'
'Cerebral peduncle white matter modeling abnormalities related to head impact exposure after a season of high school football'
Impact exposure threshold changes in gray matter and cerebrospinal fluid volumes in the absence of concussion'
'MEG measured delta waves increase after concussion'

PRESENTATIONS CONTINUED…

American Society of Clinical Oncology, Chicago, IL 2018
'The spatial distribution of brain metastasis'

Alzheimer's Association International Conference, Chicago, IL 2018
'Using multimodal imaging biomarkers to predict cognitive status in a community-dwelling older adult cohort'
'A non-human primate model of early Alzheimer's disease pathologic change'
'A diet high in saturated fat and simple carbohydrates reduces cerebral perfusion and increases levels of cerebrospinal fluid Ab42: A randomized trial'
'Investigating the impacts of diabetic status and cognitive diagnosis on 'AD signature' cortical thickness'
'Using multimodal imaging biomarkers to predict cognitive status in a community-dwelling older adult cohort'
'Longitudinal analysis of microstructural white matter change in MCI following a 6-month aerobic exercise intervention'

Radiological Society of North America's 104th Scientific Assembly and Annual Meeting, Chicago, IL 2018
'Subconcussive Head Impacts May Alter Metrics Associated with Normal Pruning in Youth and High School Football Players'
'Source Space MEG Delta Waves Increase Following Concussion'
'Longitudinal Strain Measures of White Matter Tracts in Youth Football Players'
'Effects of Repetitive Non-Concussive Head Impact Exposure on Default Mode Network Connectivity among Youth Football Players'

American Society of Pediatric Neuroradiology 1st Annual Meeting, New Orleans, LA 2019
'Patterns of Structural Co-Variance Associated with Autism Spectrum Disorder in Extremely Preterm Neonates: A Novel Voxel-Wise Graph Theoretic Approach'
'Longitudinal Analysis of Rhesus Macaque Brain Development'
'Cerebral Blood Flow Changes Associated with Repetitive Head Impact Exposure in Youth Football'
'Acute Effects of Concussion on Cerebral Blood Flow in Frontal Cortex among Adolescent Football Players'
'Relationship Between Neck Muscle Volumes and Rotational Head Accelerations from Head Impacts in High School Football

American Academy of Neurology 71st Annual Meeting, Philadelphia, PA 2019
'RDP is Associated with Bulbar and Limb Weakness: Broadening the Phenotype of ATP1A3+ Rapid-Onset Dystonia-Parkinsonism (RDP)'
'Neural Correlates Associated with Executive Function in Patients with ATP1A3 Mutations'
'Effects of ATP1A3 Mutations on Default Mode Network Connectivity'

The International Parkinson and Movement Disorder Society (MDS), Nice, France 2019
'RDP is associated with bulbar and limb weakness: broadening the phenotype of ATP1A3+ Rapid-Onset Dystonia-Parkinsonism (RDP)'
'Quantitative assessments better delineate rare disease: reconsidering the diagnostic criteria in ATP1A3+ Rapid-Onset Dystonia-Parkinsonism (RDP)'

25th Annual Meeting of the Organization for Human Brain Mapping, Rome, Italy 2019
'Cerebral Blood Flow Changes Associated with Repetitive Head Impact Exposure in Youth Football'
'Effects of Vascular Risk Factors on White and Gray Matter Perfusion in Cognitively Normal and MCI.'

PRESENTATIONS CONTINUED…

'Fiber-Specific White Matter Morphometry in MCI Following a 6-Month Exercise Intervention'

The Alzheimer's Association International Conference, Las Angeles, CA 2019
'Vascular Risk Factors and Multimodal Neuroimaging Biomarkers: Preliminary Analyses from the Multi-Ethnic Study of Atherosclerosis (MESA)'
'Diet-Related Alterations in White Matter Microstructure in Participants at-Risk for AD'
'In Vivo Evaluations of Microtubule-Based PET Radiotracer, [11C]MPC-6827 in Murine Models of Alzheimer's Disease'
'Multi-Scale Analysis of White Matter Degeneration in Cognitively Normal and MCI Adults'
'Delta Wave Activity Associated with Healthy Aging and Cognitive Function: A Magnetoencephalography Study'
'Patterns of Structural Co-Variance Associated with Alzheimer's Disease: A Novel Voxel-Wise Graph Theoretic Approach'

American Society of Functional Neuroradiology 13th Annual Meeting, San Francisco, CA 2019
'An automated deep learning approach to classifying brain metastases by unknown primary metastatic tumor type using clinical MRI data'
'Associations between Cerebral Blood Flow and Executive Function in Patients with ATP1A3 Mutations'
'Associations between ATP1A3 Mutations and Default Mode Network Connectivity'
'Resolution of Default Mode Network Connectivity Differences Between Participants with Normal Cognitive Function and Mild Cognitive Impairment after Modified Mediterranean Ketogenic Diet Intervention'

INVITED EXTRAMURAL PRESENTATIONS AND SEMINARS

Cohen Veterans Bioscience State of the Science Summit: Paths to Treatment for Traumatic Brain Injury, Washington, DC 2019
'Advancing Brain Health for Traumatic Brain Injury: Quantitative Neuroimaging for Precision Medicine and Clinical Translation in the Learning Healthcare System'

Taipei Imaging Summit, Taipei, Taiwan 2019
'Artificial Intelligence Applied to Radiomics'
'Artificial Intelligence Applied to Mild TBI/Concussion'

25th European Congress of Radiology, Austria, Vienna 2019
'Artificial intelligence for intelligent reconstruction methods for radiation protection measures'

7th Annual ATP1A3 in Disease Symposium, Chicago, IL 2018
'Clinical imaging biomarkers in ATP1A3 diseases'

International Society for Magnetic Resonance Annual Meeting, Paris, France 2018
'Functional MRI and Cannabis'

The Foundation of the ASNR Symposium 2018: Emergency Neuroradiology, Vancouver, BC, Canada 2018
'Head Trauma: Rules of Engagement'
'Radiomics and Artificial Intelligence'

Department of Radiology, Mayo Clinic, Rochester, MN 2017
'Effects of subconcussive head impact exposure on structure/function of the developing brain'

PRESENTATIONS CONTINUED…

Cure Alternating Hemiplegia of Childhood (AHC) Meeting, Boston, MA 2017
'Associations between brain structure/function and motor-related manifestations of ATP1A3 gene mutations'

Winemakers Dinner Symposium, Childress Institute of Pediatric Trauma, Lexington, NC 2017
'What have we learned about sports-related pediatric head impact exposure from the NIH- funded Wake Forest iTAKL studies?'

Department of Radiology, Stanford University School of Medicine, Palo Alto, CA 2017
'Using advanced MRI to investigate subconcussive head impact exposure'

The 10th Myanmar Radiological Society Meeting, Yangon, Myanmar 2016
'Blunt Head Injury and Brain Trauma'
'Stroke and Related Disorders'

The Foundation of the ASNR Symposium 2016: Emergency Neuroradiology, Washington, DC 2016
'Advanced imaging in sports-related traumatic brain injury'

The Brain Imaging Symposium: ASNR International Imaging Series, Bangkok, Thailand 2016
'Advanced Neuroimaging in mTBI'

International Society for Magnetic Resonance in Medicine 24th Annual Meeting, Singapore 2016
'TBI: Resting-State Functional MRI'

International Brain Injury Association (IBIA) - Eleventh World Congress on Brain Injury, Hague, Netherlands 2016
'Effects of cumulative subconcussive head impact exposure associated with youth football on white matter microstructural integrity'

Weill Cornell Medical College, New York, NY 2016
Grand Rounds: 'Advanced imaging of sports-related subconcussive head impact exposure'

University of California Neurotrauma Symposium, Santa Barbara, CA 2015
'Effects of sports-related cumulative head impact exposure on the developing brain: A multimodal neuroimaging approach'

International Society for Magnetic Resonance in Medicine 23rd Annual Meeting, Toronto, ON, Canada 2015
Genomics, Proteomics, & Big Data Course: 'Managing Big Data from MRI: the Neuroradiologist's Perspective'
Genomics, Proteomics, & Big Data Course: 'Managing Big Data: Getting Better Insight'
'Clinical utility of arterial spin labeling MRI'

American Society of Functional Neuroradiology 9th Annual Meeting, Tucson, AZ 2014
'Dynamic Resting State'
'PCA, ICA, Graph Theory'

Radiologic Society of North America 2014 Annual Meeting, Tucson, AZ 2014
RSNA Press Conference: 'High School Football Players Show Brain Changes after One Season, Even in the Absence of Concussion'

PRESENTATIONS CONTINUED…

International Society for Magnetic Resonance in Medicine Scientific Workshop, Charleston, SC
Functional MRI: Emerging Techniques & New Interpretations 2014
'Clinical Perspectives in fMRI: Current state of neuroradiologic applications for patient care'

American Society of Functional Neuroradiology 8th Annual Meeting, Miami, FL 2014
'Advanced Resting State Analysis and Research Applications: PCA, ICA, Graph Theory'

Joint ASNR- ACR HII-ASFNR TBI Workshop: Bringing Advanced Neuroimaging for TBI into the Clinic, Montreal, Quebec, Canada 2014
'Plenary Session: From population-based to patient-based TBI imaging interpretation: Setting the stage, defining the problem and drawing a roadmap towards an ultimate goal'

American Society of Neuroradiology 52nd Annual Meeting, Montreal, Quebec, Canada 2014
'Introduction to the ASNR Study Group for the Clinical Translation of Functional and Diffusion MRI'
'Translational Imaging'
'Patterns of Structural Co-Variance Associated with Autism Spectrum Disorder in Extremely Preterm Neonates: A Novel Voxel-Wise Graph Theoretic Approach'
'Imaging the neonatal brain: Advanced MRI methods and analysis techniques'

American Society of Functional Neuroradiology 7th Annual Meeting, Charleston, SC 2013
'Advanced Resting State Analysis and Research Applications: PCA, ICA, Graph Theory'

American Society of Neuroradiology 49th Annual Meeting, 2011, Seattle, WA 2011
'It's a small world after all: The application of graph theoretical analysis to the study of brain network connectivity'

PUBLICATIONS

PEER-REVIEWED PUBLICATIONS:

Metabolic mapping of the effects of oral alcohol self-administration in rats. Porrino LJ, Williams-Hemby L, Whitlow C, Bowen C, Samson HH. Alcohol Clin Exp Res 1998;22:176-82.

Effects of the self-administration of ethanol and ethanol/sucrose on rates of local cerebral glucose utilization in rats. Porrino LJ, Whitlow CT, Samson HH. Brain Res 1998;791:18-26.

Multiphasic consequences of the acute administration of ethanol on cerebral glucose metabolism in the rat. Lyons D, Whitlow CT, Porrino LJ. Pharmacol Biochem Behav 1998;61:201-6.

Brain imaging. Functional consequences of ethanol in the central nervous system. Lyons D, Whitlow CT, Smith HR, Porrino LJ. Recent Dev Alcohol 1998;14:253-84.

Metabolic mapping of the time-dependent effects of Delta9- tetrahydrocannabinol administration in the rat. Whitlow CT, Freedland CS, Porrino LJ. Psychopharmacology (Berl) 2002;161:129-36.

Dose-dependent effects of Delta9- tetrahydrocannabinol on rates of local cerebral glucose utilization in rat. Freedland CS, Whitlow CT, Miller MD, Porrino LJ. Synapse 2002;45:134-42.

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Functional consequences of the acute administration of the cannabinoid receptor antagonist, SR141716A, in cannabinoid-naïve and-tolerant animals: a quantitative 2-[14C] deoxyglucose study. Freedland CS, Whitlow CT, Smith HR, Porrino LJ. Brain Res 2003;962:169-79.

Functional consequences of the repeated administration of Delta9-tetrahydrocannabinol in the rat. Whitlow CT, Freedland CS, Porrino LJ. Drug Alcohol Depend 2003;71:169-77.

Patterns of functional activity associated with cocaine self-administration in the rat change over time. Macey DJ, Rice WN, Freedland CS, Whitlow CT, Porrino LJ. Psychopharmacology (Berl) 2004;172:384- 92.

Long-term heavy marijuana users make costly decisions on a gambling task. Whitlow CT, Liguori A, Livengood LB, Hart SL, Mussat-Whitlow BJ, Lamborn CM, Laurienti PJ, Porrino LJ. Drug Alcohol Depend 2004;76:107-11.

Investigating sacroplasty: technical considerations and finite element analysis of polymethylmethacrylate infusion into cadaveric sacrum. Whitlow CT, Yazdani SK, Reedy ML, Kaminsky SE, Berry JL, Morris PP. AJNR Am J Neuroradiol 2007;28:1036-41.

Sacroplasty versus vertebroplasty: comparable clinical outcomes for the treatment of fracture-related pain. Whitlow CT, Mussat-Whitlow BJ, Mattern CW, Baker MD, Morris PP. AJNR Am J Neuroradiol 2007;28:1266-70.

Anoxic injury-associated cerebral hyperperfusion identified with arterial spin-labeled MR imaging. Pollock JM, Whitlow CT, Deibler AR, Tan H, Burdette JH, Kraft RA, Maldjian JA. AJNR Am J Neuroradiol 2008;29:1302-7.

Hypercapnia-induced cerebral hyperperfusion: An underrecognized clinical entity. Pollock JM, Deibler AR, Whitlow CT, Tan H, Kraft RA, Burdette JH, Maldjian JA. AJNR Am J Neuroradiol 2009;30:378-85.

Endovascular histologic effects of ultrathin gold- or vitronectin-coated platinum aneurysm coils in a rodent arterial occlusion model: a preliminary investigation. Whitlow CT, Geer CP, Mattern CW, Mussat-Whitlow BJ, Yazdani SK, Berry JL, Lalli JH, Claus RO, Challa VR, Morris PP. AJNR Am J Neuroradiol 2009;30:85-90.

Pulsed arterial spin-labeled MR imaging evaluation of tuberous sclerosis. Pollock JM, Whitlow CT, Tan H, Kraft RA, Burdette JH, Maldjian JA. AJNR Am J Neuroradiol 2009;30:815-20.

Arterial spin-labeled MR perfusion imaging: clinical applications. Pollock JM, Tan H, Kraft RA, Whitlow CT, Burdette JH, Maldjian JA. Magn Reson Imaging Clin N Am 2009;17:315-38.

Imaging and treatment of sacral insufficiency fractures. Lyders EM, Whitlow CT, Morris PP. AJNR Am J Neuroradiol 2010;31:201-10.

CT perfusion for stroke: Should you use it? Lantos G, Geer CP, Whitlow CT, Bradley WG. Diagnostic Imaging 2010;32:1-11.

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Response of arteriovenous malformations to gamma knife therapy evaluated with pulsed arterial spin-labeling MRI perfusion. Pollock JM, Whitlow CT, Simonds J, Stevens EA, Kraft RA, Burdette JH, Maldjian JA. AJR Am J Roentgenol 2011;196:15-22.

Isolated fractures of the posterior maxillary sinus: CT appearance and proposed mechanism. Simonds J, Whitlow CT, Chen MYM, Williams DW III. AJNR Am J Neuroradiol 2011;32:468-70.

Effect of resting-state fMRI-BOLD acquisition duration on stability of graph theory network metrics of brain network connectivity. Whitlow CT, Casanova R, Maldjian JA. Radiology 2011;259:516-24.

High dimensional classification of structural MRI Alzheimer's disease data based on large scale regularization. Casanova R, Whitlow CT, Wagner B, Williamson J, Shumaker SA, Maldjian JA, Espeland MA. Front Neuroinform 2011;22:1-9.

Combining graph and machine learning methods to analyze differences in functional connectivity across sex. Casanova R, Whitlow CT, Wagner B, Espeland MA, Maldjian JA. Open Neuroimag J 2012;6:1-9.

Racial differences in cerebral white matter hyperintensity between African Americans and European Americans with type 2 diabetes. Divers J, Hugenschmidt C, Sink KM, Williamson JD, Ge Y, Smith SC, Bowden DW, Whitlow CT, Maldjian JA, Freedman BI. J Stroke Cerebrovasc Dis 2013 Oct;22:e46-52

Percutaneous pediculoplasty for traumatic pedicle fracture: A technical case report. Singh J., Baker MD, Morris PP, Whitlow CT. Interv Neuroradiol 2012;18:221-6.

Whither the hippocampus? FDG-PET hippocampal hypometabolism in Alzheimer disease revisited. Maldjian JA, Whitlow CT. AJNR Am J Neuroradiol 2012;34:2265-70.

A method to investigate the size and shape variation of the lateral ventricles with age. Urban JE, Maldjian JA, Whitlow CT, Stitzel JD. Biomed Sci Instrum 2012;48:447-53.

Motor vehicle crash-related subdural hematoma from real-world head impact data. Urban JE, Whitlow CT, Edgerton CA, Maldjian JA, Powers AK, Stitzel JD. J Neurotrauma 2012;29:2774-81.

Clinical applications of magnetic resonance arterial spin labeled perfusion imaging. Watts JM, Whitlow CT, Maldjian JA. NMR Biomed 2013;26:892-900.

Evaluation of the extent and distribution of diffuse axonal injury from real world motor vehicle crashes - biomed 2013. Lillie EM, Urban JE, Lynch SK, Whitlow CT, Stitzel JD. Biomed Sci Instrum 2013;49:297- 304.

Computed tomography supports histopathologic evidence of vestibulocochlear sexual dimorphism. Marcus S, Whitlow CT, Koonce J, Zapadka ME, Chen MY, Williams DW, Lewis M, Evans AK. Int J Pediatr Otorhinolaryngol 2013;77:1118-22.

An unusual aetiology for internuclear ophthalmoplegia. Vishwas MS, Whitlow CT, Ihtsham ul Haq. BMJ Case Rep 2013 [Epub ahead of print]

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Head impact exposure in youth football: high school ages 14 to 18 years and cumulative impact analysis. Urban JE, Davenport EM, Golman AJ, Maldjian JA, Whitlow CT, Powers AK, Stitzel JD. Ann Biomed Eng 2013;41:2474-87.

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Head impact exposure in youth football: elementary school ages 9-12 years and the effect of practice structure. Cobb BR, Urban JE, Davenport EM, Rowson S, Duma SM, Maldjian JA, Whitlow CT, Powers AK, Stitzel JD. Ann Biomed Eng 2013;41:2463-73.

Cerebral blood flow quantification in swine using pseudo-continuous arterial spin labeling. Johnston ME, Zheng Z, Maldjian JA, Whitlow CT, Morykwas MJ, Jung Y. J Magn Reson Imaging 2013;38:1111-8.

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Graph theoretical analysis of resting-state MEG data: identifying interhemispheric connectivity and the default mode. Maldjian JA, Davenport EM, Whitlow CT. NeuroImage 2014;96:88-94.

Abnormal white matter integrity related to head impact exposure in a season of high school varsity football. Davenport EM, Whitlow CT, Urban JE, Espeland MA, Jung Y, Powers AK, Stitzel JD, Maldjian JA. J Neurotrauma 2014;31:1617-24.

Rapid-onset dystonia-parkinsonism associated with the I758S mutation of the ATP1A3 gene: a neuropathologic and neuroanatomical study of four siblings. Oblak AL, Hagen MC, Sweadner KJ, Haq I, Whitlow CT, Maldjian JA, Epperson F, Cook JF, Stacy M, Murrell JR, Ozelius LJ, Brashear A, Ghetti B. Acta Neuropathol 2014;128:81-98.

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Imaging evidence and recommendations for traumatic brain injury: advanced neuro- and neurovascular imaging techniques. Wintermark M, Sanelli PC, Anzai Y, Tsiouris AJ, Whitlow CT. AJNR Am J Neuroradiol 2015;36:e1-e11.

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EDITORIAL ACTIVITIES

Board member, British Medical Journal Case Reports
Board member, Journal of Clinical Radiation Oncology
Board member, Nuclear Medicine Case Reports
Board member, Journal of Neuroscience and Clinical Research
Board member, Clinical Radiology Leaflets
Board member, BMC Medical Imaging
Board member, RadioGraphics
Ad hoc reviewer, American Journal of Neuroradiology (AJNR)
Ad hoc reviewer, Brain Research Bulletin
Ad hoc reviewer, British Medical Journal Case Reports
Ad hoc reviewer, Cerebral Cortex
Ad hoc reviewer, Journal of Clinical and Experimental Neuropsychology
Ad hoc reviewer, Journal of Neurotrauma
Ad hoc reviewer, NeuroImage
Ad hoc reviewer, Neuroradiology
Ad hoc reviewer, New England Journal of Medicine
Ad hoc reviewer, Psychopharmacology
Ad hoc reviewer, RadioGraphics
Ad hoc reviewer, Radiology

ADVISORY BOARDS

Life Aid Research Institute	2019-present
AlgoMedica	2017-present
TeraRecon	2016-present

PROFESSIONAL MEMBERSHIPS

Member, American Society of Pediatric Neuroradiology (ASPNR)	2016-present
Member, American College of Radiology (ACR)	2015-present
Member, American Medical Association (AMA)	2012-present
Member, American Society of Functional Neuroradiology (ASFNR)	2007-present
Member, American Society of Neuroradiology (ASNR)	2005-present
Member, Radiological Society of North America (RSNA)	2004-present
Member, International Society of Cerebral Blood Flow and Metabolism	2004-present
Member, Alpha Omega Alpha (AOA) Honor Medical Society	2004-present
Member, Society for Neuroscience	1998-present

POSTDOCTORAL TRAINING

University of North Carolina at Chapel Hill, Chapel Hill, NC — 2012-2014
Gillings School of Global Public Health
Executive Masters of Healthcare Administration (MHA) Program

Wake Forest School of Medicine, Winston-Salem, NC
Fellow, Neuroradiology — 2009-2011
Resident, Diagnostic Radiology — 2005-2009

Moses Cone Memorial Hospital, Greensboro, DC — 2004-2005
I*ntern*, Internal Medicine

EDUCATION

University of North Carolina at Chapel Hill, Chapel Hill, NC
Master of Healthcare Administration (MHA) — 2014

Wake Forest School of Medicine, Winston-Salem, NC
Doctor of Medicine (MD) and Doctor of Philosophy (PhD) — 2004

East Carolina University, Greensville, NC
Bachelor of Arts (BA) in Psychology — 1997

PROFESSIONAL LICENSURE

State of North Carolina, #2010-00483 — 2010-present